## CLAIMS

**WE CLAIM:**

1. A method for sourcing semiconductor manufacturing defects, comprising the steps of:

extracting one or more parameters (extracted-parameters) from a semiconductor manufacturing results file (results file), the results file indicating a set of defect-coordinates;

matching the one or more extracted-parameters against one or more candidate defect-signatures (candidate-signatures), the matching step identifying one or more matching defect-signatures (matching-signatures) of the one or more candidate-signatures as matching the one or more extracted-parameters, the one or more matching-signatures indicating an associated one or more defect-sources; and

reporting the one or more defect-sources.

2. The method of Claim 1, wherein the extracted-parameters comprise an annular defects-distribution, a radial defects-distribution or a zonal defects-distribution.

3. The method of Claim 2, a first vector representing the one or more extracted-parameters, a second one or more vectors representing the one or more candidate-signatures, a third one or more vectors representing the one or more matching-signatures, wherein the matching step comprises using a *k*-nearest-neighbor algorithm to compute the third one or more vectors, the third one or more vector representing a set of nearest-neighbors of the first vector, the set of nearest-neighbors computed from among the

second one or more vectors, and wherein $k \geq 1$ and the $k$-nearest-neighbor algorithm uses a standard Euclidean distance function.

4. The method of Claim 3, wherein the candidate-signatures are stored in a defect-signature bank.

5. The method of Claim 4, wherein the semiconductor manufacturing results file comprises a KLA results file or a FITS image file.

6. The method of Claim 5, wherein the reporting step comprises sending an alert using a fabrication plant notification system.

7. The method of Claim 1, further comprising the step of filtering the results file by defect size, defect classification, defect spectral frequency or defect intensity.

8. A method for processing a semiconductor manufacturing results file (results file), comprising the steps of:

computing a set of $k$-nearest-neighbor distances ($k$-NN distances) for a set of defect-coordinates, the set of defect-coordinates indicated by the results file; and

classifying a frequency distribution of the set of $k$-NN distances as a positively-skewed distribution, a negatively-skewed distribution, a reverse-J distribution, a bimodal distribution, an annular distribution, a radial distribution, a uniform distribution, or a normal distribution.

9. The method of Claim 8, wherein the classifying step uses a set of one or more classification-tolerances as provided by a user.

10. The method of Claim 9, further comprising the step of storing the frequency distribution in a defect-signature bank.

11. A method for processing a semiconductor manufacturing results file (results file), comprising the steps of:

determining a set of concentric wafer-rings of a wafer-map, the wafer-map given by the results file, the results file indicating a set of defect-coordinates associated with a set of wafer-defects falling within the wafer-map; and

computing a set of defect-percentages, wherein a first defect-percentage of the set of defect-percentages is (a) associated with a first wafer-ring of the set of concentric wafer-rings and (b) represents a ratio of the number of wafer-defects falling within the first wafer-ring to the total number of wafer-defects falling within the wafer-map.

12. The method of Claim 11, further comprising the step of storing the set of defect-percentages in a defect-signature bank.

13. The method of Claim 12, further comprising the step of associating a weighting-factor with the set of defect-percentages and storing the weighting-factor in the defect-signature bank.

14. A method for processing a semiconductor manufacturing results file (results file), comprising the steps of:

determining a first set of pie-slice shaped segments (wafer-slices) of a wafer-map, the wafer-map given by the results file, the results file indicating a set of defect-coordinates associated with a set of wafer-defects falling within the wafer-map; and

computing a first set of defect-percentages, wherein a first defect-percentage of the set of defect-percentages is (a) associated with a first wafer-slice of the first set of wafer-slices and (b) represents a ratio of the number of wafer-defects falling within the first wafer-slice to the total number of wafer-defects falling within the wafer-map.

15. The method of Claim 14, further comprising the step of storing the first set of defect-percentages in a defect-signature bank.

16. The method of Claim 15, further comprising the step of associating a weighting-factor with the first set of defect-percentages and storing the weighting-factor in the defect-signature bank.

17. The method of Claim 14, further comprising wrapping the first set of defect-percentages to obtain a second set of defect-percentages corresponding to a second set of wafer-slices, the second set of wafer-slices corresponding to a rotated version of the first set of wafer-slices.

18. A method for processing a semiconductor manufacturing results file (results file), comprising the steps of:

determining a first set of horizontal wafer-strips (horizontal-strips) of a wafer-map, the wafer-map given by the results file, the results file indicating a set of defect-coordinates associated with a set of wafer-defects falling within the wafer-map; and

computing a first set of horizontal-defect-percentages, wherein a first horizontal-defect-percentage of the first set of horizontal-defect-percentages is (a) associated with a first horizontal-strip of the first set of horizontal-strips and (b) represents a ratio of the number of wafer-defects falling within the first horizontal-strip to the total number of wafer-defects falling within the wafer-map.

19. The method of Claim 18, further comprising wrapping the first set horizontal-defect-percentages to obtain a second set of horizontal-defect-percentages corresponding to a second set of horizontal wafer-strips, the second set of horizontal wafer-strips corresponding to a wrapped version of the first set of horizontal wafer-strips.

20. The method of Claim 18, further comprising the steps of:

determining a first set of vertical wafer-strips (vertical-strips) of the wafer-map; and

computing a first set of vertical-defect-percentages, wherein a first vertical-defect-percentage of the first set of vertical-defect-percentages is (a) associated with a first vertical-strip of the first set of vertical-strips and (b) represents a ratio of the number of

wafer-defects falling within the first vertical-strip to the total number of wafer-defects falling within the wafer-map.

21. The method of Claim 20, further comprising wrapping the first set vertical-defect-percentages to obtain a second set of vertical-defect-percentages corresponding to a second set of vertical wafer-strips, the second set of vertical wafer-strips corresponding to a wrapped version of the first set of vertical wafer-strips.

22. The method of Claim 20, further comprising the step of storing the first set of horizontal-defect-percentages and the first set of vertical-defect-percentages in a defect-signature bank.

23. The method of Claim 22, further comprising the step of associating a weighting-factor with the first set of horizontal-defect-percentages and the first set of vertical-defect-percentages and storing the weighting-factor in the defect-signature bank.

24. A method for processing a semiconductor manufacturing results file (results file), comprising the steps of:

determining a plurality of dies within a wafer-map, the wafer-map indicated by the results file, the results file indicating a first set of defect-coordinates associated with a set of wafer-defects falling within the wafer-map;

stacking the plurality of dies resulting in a die-overlay; and

analyzing the die-overlay to detect one or more repeating patterns.

25. The method of Claim 24, wherein the analyzing step comprises a *k*-nearest-neighbor (*k*-NN) algorithm to determine the one ore more repeating patterns, and wherein the *k*-NN algorithm uses a second set of defect-coordinates, the second set of defect-coordinates corresponding to the first set of defect coordinates but modified to use the die-overlay as reference.

26. A method for processing a semiconductor manufacturing results file (results file), comprising the steps of:

determining a plurality of reticle-fields within a wafer-map, the wafer-map indicated by the results file, the results file indicating a set of defect-coordinates associated with a set of wafer-defects falling within the wafer-map;

stacking the plurality of reticle-fields resulting in a reticle-field-overlay; and

analyzing the reticle-field-overlay to detect a repeating pattern.

27. The method of Claim 26, wherein the analyzing step comprises a *k*-nearest-neighbor (*k*-NN) algorithm to determine the one ore more repeating patterns, and wherein the *k*-NN algorithm uses a second set of defect-coordinates, the second set of defect-coordinates corresponding to the first set of defect coordinates but modified to use the reticle-field-overlay as reference.

28. A pattern-bank for use in detecting manufacturing defects on a substrate, comprising:

a defect-signature; and

a defect-source associated with the defect-signature;

wherein the defect-signature indicates a defects-distribution in a region of the substrate, the defects-distribution according to an annular distribution, a radial distribution or a zonal distribution.

29. A method for processing a semiconductor manufacturing results file (results file), comprising the steps of:

filtering a first results file by defect size, defect classification, defect spectral frequency or defect intensity, the filtering step resulting in a second results file; and

storing the second results file for further defect analysis.

30. A method for processing a semiconductor manufacturing results file (results file), comprising the steps of:

computing a set of *k*-nearest-neighbor distances (*k*-NN distances) for a set of defect-coordinates, the set of defect-coordinates indicated by the (results file), the set of *k*-NN distances indicating a first defect-cluster; and

extracting a set of defect-cluster-parameters for the first defect-cluster, the set of defect-cluster-parameters comprising defect-cluster length, defect-cluster width, defect-cluster area, defect-cluster perimeter, defect-cluster centroid, radius of defect-cluster curvature, angle of defect-cluster major axis, or distance of defect-cluster to nearest scratch centroid.

31. The method of Claim 30, wherein the extracting step comprises determining an envelope around the defect-cluster.

32. The method of Claim 30, further comprising the step of matching the set of defect-cluster-parameters against a defect-signature bank.

33. A method for processing a semiconductor manufacturing results file (results file), comprising the steps of:

generating a set of defect-coordinates, the set of defects-coordinates indicating a defects-distribution; and

extracting a set of parameters (extracted-parameters) from the set of defect-coordinates, the extracted-parameters comprising an annular defects-distribution, a radial defects-distribution or a zonal defects-distribution.

34. The method of Claim 33, wherein the generating step is performed manually using a graphical user interface (GUI) for indicating the set of defect-coordinates.